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## ASIATIC PALMS.

*Annals of the Royal Botanic Garden, Calcutta*, Vol. xi. Asiatic Palms—Lepidocaryeæ. Part i., The Species of Calamus. By Odoardo Beccari. Pp. iii+518; 2 4to plates; 238 plates large fol. (Calcutta: Bengal Secretariat Press, 1908.) Price 7l.

THE palms of Asia have received considerable attention in the Royal Botanic Garden at Calcutta, where there is an extensive Palmetum, with a noble collection of living species. Roxburgh, superintendent of the garden from 1793 to 1813, studied the palms of the Indian Peninsula, and left, in addition to descriptions posthumously published in his "Flora Indica," a series of drawings of the species he knew alive. Anderson, superintendent from 1861 to 1870, described the palms of Sikkim in the Journal of the Linnean Society, vol. xi., in 1869. Kurz, curator of the Calcutta herbarium from 1864 to 1878, dealt with the palms of Burma in the Journal of the Asiatic Society of Bengal, vol. xliii., part ii., in 1874. But the work of Roxburgh was only preliminary, the work of Anderson and Kurz only supplementary to that of Griffith, who acted as superintendent of the Calcutta garden during 1842-4. This able observer died at Malacca in 1845, and his treatise, "The Palms of British East India," was not printed until 1850. Less complete than he could have made it had he lived to see it through the press, this work by Griffith yet remained the standard authority on the subject until the appearance, in 1892, of the account of the Indian Palmeæ by Beccari and Hooker in the "Flora of British India," vol. vi. The long-standing association of the great Calcutta garden with the elucidation and illustration of Asiatic palms is now happily continued by the publication in its Annals of the first portion of a comprehensive account of the family by Signor Beccari, who dedicates his work to the memory of the gifted Griffith.

This volume commences the discussion of the tribe Lepidocaryeæ, palms the fruits of which are clad in a mail of reflexed, adpressed, closely imbricating scales, and deals with the genus Calamus, the largest and most important in that tribe. Workers who know these "Rotangs" as they grow are familiar with the difficulties that attend their study; those unacquainted with these fascinating but formidable "canes" in a wild state will learn something of these difficulties from the essay with which the volume opens. All will welcome a work on the subject by one whose knowledge of the species in the field is comparable with that of Griffith himself, and who has had the advantage, which was denied to Griffith, of access to practically all the herbarium material of the genus that exists.

The greater part of the letterpress is devoted to detailed accounts of the various species which the accompanying plates illustrate. Those who study these descriptions will be grateful to the author for

the conscientious absence of uniformity in their presentation. Where his material is adequate, the author has provided full and carefully weighed statements of the specific characters; where his material is limited he has restricted himself to faithful accounts of the actual specimens on which his species are based. His work is thus free from that unconscious tendency to generalise more widely than the material at a writer's command will justify, which sometimes detracts from the value of treatises wherein the descriptions of species that depend on the study of perhaps a solitary example are cast in the same mould as those based on extensive suites of specimens. At the same time, he has shown himself fully alive to the advantages of methodical treatment, and, in a careful synopsis which immediately precedes his detailed descriptions, the author has characterised all the species he is able to recognise with sufficient fulness to admit of their determination, and in a manner that leaves nothing to be desired so far as uniformity of presentation is concerned.

In a systematic conspectus of the species, which follows the definition of the genus, the author has skilfully applied to the practical task of establishing order among what would otherwise be an undisciplined horde of forms that knowledge, at once comprehensive and minute, of the morphology of Calamus to which the introductory essay testifies. He is thereby able to throw his species into sixteen readily recognisable groups, some of which admit of further subdivision, while the whole of them are capable of aggregation into four series. One of these series, it is true, contains but a single group, the characters of which are admittedly anomalous, while the imperfect nature of the material as yet available renders it impossible, in the case of about 5 per cent. of the species, to state with certainty to what group they should be referred. But this conspectus will enable the worker in the field, whose needs should be the first consideration of conscientious systematists, to recognise with comparative ease at least the affinities of any "Rotang" he may encounter. The applied botanist, too, will feel indebted to the author for the many economic notes that accompany the detailed accounts of such species as are practically useful.

The plates which accompany the work are mainly phototype reproductions of the author's natural-size photographs of herbarium specimens; in a few cases, where the material available did not readily lend itself to this method, lithographed drawings take the place of phototypes. Photographic methods, though usually satisfactory so far as fidelity is concerned, when applied to the illustration of herbarium specimens often leave something to be desired from the æsthetic standpoint. Here, however, there is little ground for criticism on this score, and if it be true that specimens of Calamus lend themselves more readily to the requirements of photography than herbarium material usually does, this is not the whole explanation of the success that has here been achieved. That success is in large measure due to the care and skill of the author, who has, moreover, been fortunate in the matter of reproduction from his negatives, which

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reflects much credit on those to whom it has been entrusted. The size of plate adopted, it may be observed, is that of the double plates issued in former volumes of the *Calcutta Annals*, so that librarians who desire to bind the illustrations in conformity with the text are left free to do so. But there will probably be others who may prefer to leave the plates unfolded, and the editor of the series has earned the gratitude of those into whose hands this volume may come for his decision to issue the illustrations in a larger portfolio than that which contains the letterpress, thereby leaving them free to decide the course to be adopted. The work before us is a valuable addition to the series of volumes for the initiation of which the scientific world is indebted to the late Sir George King, and botanists generally will not only feel grateful to Signor Beccari for its preparation, but will desire to associate themselves with him in his appreciation of that "enlightened munificence" on the part of the Government of Bengal which has rendered its appearance possible.

#### GYROSCOPIC MOTION.

*An Elementary Treatment of the Theory of Spinning Tops and Gyroscopic Motion.* By Harold Crabtree. Pp. xii+140 and 3 plates; with illustrations. (London, New York, Bombay, and Calcutta: Longmans, Green and Co., 1909.) Price 5s. 6d. net.

THIS enchanting and bewildering subject has in recent years been admirably expounded in two well-known books, one somewhat more severe in its treatment than the other. The author has now provided a third, which will be valued by those who already possess and take pleasure in the other two even more than by those who approach the subject for the first time. The mathematical treatment is far more severe, so much so that the average student who scoffs at the term elementary on the back of some of his text-books will certainly in this case consider it inconsistent with the subject-matter of the last few chapters. However, if he will afterwards read the subject in, say, the "Encyclopædia Britannica," he will realise that the term is not so misleading after all.

The method by which the theory is introduced is admirable. In an introductory chapter, illustrated by twenty-six figures, all sorts of tops and spinning things, familiar and otherwise, are described, and their curious behaviour in each case simply stated. An interest is thus awakened, and the reader, if unfamiliar with the subject, realises at once what sort of thing he is going to have presented to him. In the writer's opinion this method would be advantageous generally where a difficult subject is being opened. If, for instance, before the first chapter of the typical book on the integral calculus or before Euclid's definitions there were a lightly written chapter giving more or less familiar experiences which are puzzling, but which will in due time be made clear, the reader would be more encouraged than he is by the existing openings.

The author clears the ground by giving very exact

ideas on the subject of rotation about a fixed axis, laying stress at every point on the dimensional identity of the two sides of every equation. In dealing with the subject of precession, he is by no means content to handle the ultimate condition of steady precession, but he goes fully into that more difficult subject which may be summarised under the term gyrostatic elasticity, and which includes the immediate displacements and vibrations or wobbles of axes when disturbing couples are applied or removed.

The latter part of the book is in large part devoted to the difficulties connected with the motions of the axis of rotation of an ellipsoidal body within itself and in space. Among matters of interest discussed will be found the behaviour of celts, the self-turning of a falling cat, with cinematograph views, the diabolo, the Brennan mono-rail, and Schlick's gyroscopic device for steadying ships.

While criticism is misplaced, the writer would suggest that those diagrams, such as Fig. 20, in which bent arrows are intended to show a direction of rotation round an axis indicated by a line, are, as drawn, ambiguous, for it is impossible to tell whether the arrow is intended to be in front of or behind the line. If one or other were broken through the meaning would be evident, as it is, for instance, in Fig. 18, where the arrow is clearly in front of a material axle.

C. V. BOYS.

#### MAGIC SQUARES.

*Easy Methods of Constructing the Various Types of Magic Squares and Magic Cubes, with Symmetric Designs founded Thereon.* By Dr. John Willis. Pp. 256. (Bradford and London: Percy Lund, Humphries and Co., Ltd., 1909.)

A MAGIC square is an example of a problem which is a particular case of another which from its enunciation may be subjected to mathematical analysis. The  $n^2$  cells of a square of order  $n$  may be supposed occupied, each of them, by one or more numbers in such wise that the sums of the numbers in the  $n$  rows and in the  $n$  columns have given values varying from row to row and from column to column. The enumeration of such squares, or more generally of such rectangles, has been made the subject of mathematical investigation employing algebraic symmetric functions and the allied differential operators, and complete success has resulted. The absolute magnitude of the numbers appearing in the cells may be restricted, and any number of the cells may be empty; no additional difficulties present themselves. Other problems of enumeration of the magic square kind, of which the simplest is known as the Latin square, first examined by Euler, and by others up to the time of Cayley, have also in recent years completely yielded to the same calculus of symmetric functions. In all these cases row and column properties are dealt with, but directly we introduce what may be termed diagonal properties the analysis fails to overcome the great difficulties which are thereby imported into the problems. The problem of the magic square involves restrictions and limitations of